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09/903,709	07/13/2001	Toshihiko Ouchi	35.G2856	9180

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EXAMINER
KIM, RICHARD H

ART UNIT	PAPER NUMBER
2871	

DATE MAILED: 09/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/903,709	OUCHI ET AL.	
	Examiner	Art Unit	
	Richard Kim	2871	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-5,7-14,17,19-29,31,33-37 and 42-44 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-5,7-14,19-29,31,33-37 and 42-44 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 2, 3, 5, 8, 9, 11, 17, 19, 20, 22 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuda (US 5,434,939).

Referring to claim 1, 19 and 44, Matsuda discloses a device comprising a substrate (see abstract); a surface optical device being arranged on the substrate (see Fig. 1), the surface optical device being capable of emitting or receiving light through a surface of the surface optical device (abstract); a light transmission member optically coupled to the surface optical device (see Fig. 2, ref. 204), and a thick layer formed of a curable material (see Fig. 1, ref. 113; col. 4, lines 11-12), in which a guide hole for inserting an end portion of a light-transmission member therein is formed at a position corresponding to the surface of the surface optical device such that the surface optical device can be optically coupled to the light-transmission member inserted in the guide hole (see abstract). As to the product-by-process limitation "wherein said guide hole is formed in the thick layer by performing a patterning on the thick layer using photolithography to selectively harden the thick layer and developing the thick layer", it has been recognized that "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not on its method of production. If the product in the product-by-process claims is the same as

or obvious from a product of the prior art, the claim is unpatentable even though the prior art product was made by a different process". *In re Thorpe.* 227 USPQ 964, 966 (Fed. Cir. 1985). See also MPEP 2113. However, the reference does not disclose that the thick layer is formed of a radiation-curable or electron-beam-curable material.

It would have been obvious to one having ordinary skill in the art at the time the invention was made for the thick layer to be formed of a radiation-curable or electron-beam-curable material since radiation allows precise and efficient curing, thereby improving the ease of fabricating the device.

Referring to claim 2, Matsuda disclose the device previously recited. However, the reference does not disclose that the curable material is polymerizable resist.

It would have been obvious to one having ordinary skill in the art at the time the invention was made for the curable material to be polymerizable resist since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin,* 125 USPQ 416.

Referring to claim 3, Matsuda discloses the device previously recited. However, the reference does not disclose that the thickness of the thick layer is in the range between 10 microns to 1000 microns.

It would have been obvious to one having ordinary skill in the art at the time the invention was made for the thickness to be in the range between 10 microns to 1000 microns in order to have the layer thick enough to hold the optical fiber in a stable manner. Moreover, it has

been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233.

Referring to claims 5, Matsuda discloses a device wherein the guide hole is contoured corresponding to an outer shape of the light-transmission member (see Fig. 4).

Referring to claim 8, Matsuda discloses a device where the surface optical device comprises a surface-light emitting device only (see Fig. 2, ref. 204).

Referring to claim 9, Matsuda discloses the device previously recited. However, the reference does not disclose that the surface optical device comprises a surface light-receiving device only.

It would have been obvious to one having ordinary skill in the art at the time the invention was made for the surface optical device comprise a surface light-receiving device only since applicant has disclosed a plurality of optical devices (optical receiving and optical emitting), and therefore is not a critical feature Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to use both optical devices in order to couple light between the optical device and the fiber.

Referring to claim 11, Matsuda discloses a device wherein the surface light-emitting device comprises a vertical cavity surface emitting laser (see abstract).

Referring to claim 17, Matsuda discloses a device wherein the surface optical device comprises a thinned surface optical device without a growth substrate (see Fig. 2, ref. 204).

Referring to claim 20, Matsuda discloses a device further comprising an electronic device provided on the substrate in a hybrid manner, the electronic device being electrically connected to the surface optical device (see Fig. 1, ref. 102,105,106).

Referring to claim 22, Matsuda discloses a device wherein the light transmission member comprises an optical fiber (see Fig. 1, ref. 112).

3. Claims 4, 7 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuda in view of Murata (US 6,568,863 B2).

Referring to claim 4, Matsuda discloses the device previously recited. Matsuda also discloses an upper layer formed on a lower layer with a guide hole for fixing the light-transmission member therein, and a distance between the surface of the surface optical device and an end face of the light-transmission member is regulated by a thickness of the lower layer (see Fig. 2). However, the reference does not disclose that the thick layer comprises a lower layer with a hole with a size of which is smaller than a size of the light-transmission member and which transmits light therethrough.

Murata discloses a lower layer with a hole a size of which is smaller than a size of the light transmission-member and which transmits light therethrough (see Fig. 12, ref. 116).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ a lower layer with a hole a size of which is smaller than a size of the light transmission-member and which transmits light therethrough in order to securely hold the fiber within hole. Moreover, such a modification would enable light to be gradually coupled to the optical fiber, thereby minimizing insertion loss.

Referring to claims 7 and 21, Matsuda discloses the device previously recited. However, the reference does not disclose that a plurality of optical devices is arrayed, and a plurality of the guide holes is arrayed corresponding to the arrayed surface optical devices.

Murata discloses a device wherein a plurality of the surface optical devices is arrayed, and a plurality of the guide holes is arrayed corresponding to the arrayed surface optical devices (see Fig. 37).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a plurality of the surface optical devices arrayed, and a plurality of the guide holes arrayed corresponding to the arrayed surface optical devices in order to improve the efficiency of the device by transmitting or receiving more than one optical signal at one time. Moreover, it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. V. Bemis Co.,* 193 USPQ 8.

4. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuda in view of Minot et al. (US 5,946,438).

Matsuda discloses the device previously recited. Matsuda further discloses the device wherein that surface light emitting device comprises a surface emitting laser with only a function layer including an active layer, a cavity layer (see Fig. 2, ref. 207), and distributed mirror layers sandwiching the active layer (see Fig. 2, ref. 206, 208). However, the reference does not disclose that the mirrors are DBR mirrors.

Minot et al. discloses DBR mirrors sandwiching an active layer (see Fig. 1, ref. 33, 31).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ DBR mirrors sandwiching an active layer in order to simplify fabrication. In DBR mirrors, the period grating that produces feedback is removed from the gain regions to simply fabrication. Therefore, the grating at each end of the active region acts as simple reflectors.

5. Claims 23-29, 33-36, 42 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuda in view of Jian (US 6,527,455 B2).

Referring to claims 23, 24, 35 and 36, Matsuda discloses the device previously recited. However, the reference does not disclose that the optical fiber is a polymer-containing plastic optical fiber, silica-containing optical fiber, a perfluorinated containing optical fiber or a PMMA-containing optical fiber.

Jian discloses a polymer-containing plastic fiber (see col. 1, lines 25-27).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ a polymer-containing plastic optical fiber since one would be motivated to improve the durability of the device by employing a break resistant material. Moreover, since applicant has disclosed a plurality of materials for the optical fiber, it is a non-critical feature of the invention. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to have used any desirable and optimal material for the optical fiber.

Referring to claim 25-27, Matsuda discloses the device previously recited. However, the reference does not disclose a resin filling a space between an end face of the optical fiber and the surface optical device, wherein the resin is a curable transparent resin.

Jian discloses a resin filling a space between an end face of the optical fiber and a surface optical device wherein the resin is a transparent resin (see Fig.5, ref. 500).

It would have been obvious to one having ordinary skill in the art at the time the invention was made for the device to comprise a resin filling a space between an end face of the optical fiber and a surface optical device, wherein the resin is a transparent resin, in order to improve the coupling efficiency of the device. According to Jain "An epoxy layer is used to directly couple the optical device to the second layer" (see col. 9, lines 43-44). Moreover, it would have been obvious for the resin to be curable in order to avoid leakage of the resin from the device.

Referring to claims 28 and 29, Matsuda and Jian disclose the device previously recited. However, the references do not disclose that the optical fiber contain a lens-shaped end portion, and wherein the lens-shaped end portion of the optical fiber is shaped into a concave portion, and the concave portion is filled with a resin having a refractive index larger than a refractive index of the plastic optical fiber.

Jian discloses a lens-shaped portion coupled to the end of the optical fiber (see Fig. 6, ref. 650) and wherein the lens-shaped end portion of the optical fiber is shaped into a concave portion (see Fig. 6, ref. 650).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to for the optical fiber to contain a lens-shaped end portion and wherein the

lens-shaped end portion of the optical fiber is shaped into a concave portion, and the concave portion is filled with a resin having a refractive index larger than a refractive index of the plastic optical fiber since one would be motivated to improve the coupling efficiency of the device. The lens-shaped portion enables focusing of the light beam to the optical fiber, thereby improving coupling efficiency. Moreover, having the lens shaped portion directly contained as a portion of the optical fiber or disposing it at the end of a resin material as shown in Jian, both invention comprise a focusing element within the path of the light beam between the optical device and optical fiber, and have the lens-shaped portion as part of the optical fiber does not provide a clear added advantage, purpose, or solves a stated problem over the Jian. Therefore, such a modification would be functionally equivalent to improve the coupling efficiency from one optical device to another.

Referring to claim 33, Matsuda and Jian disclose the device previously recited. However, the reference does not disclose that the lens-shaped end portion of the polymer-containing plastic optical fiber is formed by pressing an end face of the optical fiber against a heated concave or convex mold.

As to the product-by-process limitation, it has been recognized that "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not on its method of production. If the product in the product-by-process claims is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior art product was made by a different process". *In re Thorpe.* 227 USPQ 964, 966 (Fed. Cir. 1985). See also MPEP 2113.

Referring to claim 34, Matsuda and Jian disclose the device previously recited. However, the reference does not disclose that the lens-shaped end portion of the polymer-containing plastic optical fiber is formed by immersing an end portion of the optical fiber in an organic solvent and lifting the end portion from the organic solvent to dry the end portion.

As to the product-by-process limitation, it has been recognized that "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not on its method of production. If the product in the product-by-process claims is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior art product was made by a different process". *In re Thorpe.* 227 USPQ 964, 966 (Fed. Cir. 1985). See also MPEP 2113.

Referring to claims 42 and 43, Matsuda discloses a method comprising the steps of forming functional layers of surface optical device on a growth substrate (see Fig. 2, ref. 201), forming a plurality of sets of electric wiring patterns of a plurality of respective areas of an implement substrate (see Fig. 2, ref. 106), bonding at least a surface optical device, which is cut from the growth substrate with the functional layers of the surface optical devices, to each respective areas of the implement substrate (see Fig. 3A-3C), forming a thick layer of radiation-curable or electron curable material with a guide hole on each surface optical device (see Fig. 2, ref. 218), implementing an electronic device on each respective area of the implement substrate in a flip-chip manner (see Fig. 1, ref. 102, 105, 106), dicing the implement substrate such that the respective areas of the implement substrate are separated from each other (see Fig. 3A-3D); and inserting an optical fiber into each guide hole such that the surface optical device is optically coupled to the light-transmission member inserted in the guide hole (see Fig. 2, ref. 217).

However, the reference does not disclose that the thick layer of radiation curable material is formed using photolithography.

Jian discloses a thick layer of radiation curable material is formed using photolithography (see col. 2, lines 62-67).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the thick layer using photolithography in order to improve the precision of alignment by using a precise etching technique such as photolithography.

5. Claims 10, 12 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuda, in view of Kravitz et al. (US 5,790,730).

Referring to claim 10, Matsuda discloses the device previously recited. However, the reference does not disclose the device wherein there is a plurality of surface optical devices and the plurality of the surface optical devices comprise at least a surface light-emitting device and at least a surface light-receiving device.

Kravitz et al. discloses a device wherein there is a plurality of surface optical devices optical devices and the plurality of the surface optical devices comprise at least a surface light-emitting device and at least a surface light-receiving device (see col. 1, line 25).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ a plurality of surface optical devices and the plurality of the surface optical devices comprise at least a surface light-emitting device and at least a surface light-receiving device in order to improve the versatility of the device by allowing the device to

have multiple functions and to perform the functions at one time, thereby further improving the efficiency of the device.

Referring to claim 12, Matsuda discloses a device wherein the surface light-emitting device comprises a vertical cavity surface emitting laser (see abstract).

Referring to claim 37, Matsuda discloses the device previously recited. However, the reference does not disclose that the substrate is formed of a material which has a heat sink function.

Kravitz et al. discloses a device wherein the substrate is formed of a material which has a heat sink function (see col. 6, lines 30-34).

It would have been obvious to one having ordinary skill in the art for the substrate to be formed of a material which has a heat sink function in order to facilitate heat discharge of the substrate, thereby improving the durability of the device.

6. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuda and Minot and Kravitz et al., in view of Minot et al.

Matsuda and Kravitz et al. disclose the device previously recited. Matsuda further discloses the device wherein that surface light emitting device comprises a surface emitting laser with only a function layer including an active layer, a cavity layer (see Fig. 2, ref. 207), and distributed mirror layers sandwiching the active layer (see Fig. 2, ref. 206, 208). However, the reference does not disclose that the mirrors are DBR mirrors.

Minot et al. discloses DBR mirrors sandwiching an active layer (see Fig. 1, ref. 33, 31).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ DBR mirrors sandwiching an active layer in order to simplify fabrication. In DBR mirrors, the period grating that produces feedback is removed from the gain regions to simply fabrication. Therefore, the grating at each end of the active region acts as simple reflectors.

7. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuda and Jian, in view of Inokuchi (US 6,332,721).

Matsuda and Jian disclose the device previously recited. However, the reference does not disclose that the space between an end face of the optical fiber and the surface optical device is filled with an inert gas.

Inokuchi discloses a space between and end face of an optical fiber and an optical device is filled with an inert gas (see col. 4, lines 12-14).

It would have been obvious to one having ordinary skill in the art at the time the invention was made for the end face of the optical fiber and the surface optical device filled with an inert gas in order to "improve the life span reliability" (see col. 1, lines 15-18).

Election/Restriction

1. Applicant's election with traverse of the election of species requirement in Paper No. 4 is acknowledged. The traversal is on the ground(s) that it is the Applicant's right to present claims

to a "reasonable" number of species. This is not found persuasive because Examiner asserts that the nine species are patentably distinct and exceeds a reasonable number of species. Nine species, creates a burden to the examiner, requiring nine different areas of search. The patentably distinct species comprises:

(1) the specifics of the device and the process being comprised of a surface optical device apparatus with a plastic optical fiber comprising a first embodiment which corresponds to Figures 4-8;

(2) the specifics of the device and the process being comprised of a surface optical device apparatus with a lens portion comprising a second embodiment which corresponds to Figure 9;

(3) the specifics of the device and the process being comprised of a surface optical device apparatus in which the device is fabricated on a GaAs substrate comprising a third embodiment which corresponds to Figure 10;

(4) the specifics of the device and the process being comprised of a surface optical device apparatus in which a thick resist layer has a two-step structure such that the distance between the emitting surface of the surface emitting laser and the end face of the optical fiber can be appropriately regulated comprising a fourth embodiment which corresponds to Figure 11;

(5) the specifics of the device and the process being comprised of a surface optical device apparatus comprising a flat pattern of a thick resist layer comprising a fifth embodiment which corresponds to Figure 12;

(6) the specifics of the device and the process being comprised of a surface optical device apparatus wherein an optical fiber with a convex lens portion, a thick resist layer with a two-step

guide hole, and a light emitting diode are used comprising a sixth embodiment which corresponds to Figure 13;

(7) the specifics of the device and the process being comprised of a surface optical device apparatus wherein an optical fiber with a concave end face and a thick resist layer with a two-step guide hole are used comprising a seventh embodiment which corresponds to Figure 14;

(8) the specifics of the device and the process being comprised of a high-speed optical wiring device comprising an eighth embodiment which corresponds to Figure 15A-15C;

(9) the specifics of the device and the process being comprised of an electric connector with an electric connecting pin comprising a ninth embodiment which corresponds to Figure 16.

The requirement is still deemed proper and is therefore made FINAL.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Kim whose telephone number is (703)305-4791. The examiner can normally be reached on 9:00-6:30 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H Kim can be reached on (703)305-3492. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

Richard Kim
Examiner
Art Unit 2871

RHK

T. Chowdhury
Primary Examiner